Freecom LTO OEM HH Series
Technical Specifications

FREECOM
INNOVATIVE GERMAN QUALITY

		LTO-2 HH Ultrium 448	LTO-3 HH Ultrium 920	LTO-4 HH Ultrium 1760	LTO-5 HH Ultrium 3000
Dimensions	Form Factor	5¼-inch half-height	5¼-inch half-height	5¼-inch half-height	5¼-inch half-height
	Physical (HxWxD) **Internal**	1.6 x 5.7 x 8.1 in (4.1 x 14.5 x 20.6 cm)	1.6 x 5.7 x 8.1 in (4.1 x 14.5 x 20.6 cm)	1.6 x 5.7 x 8.1 in (4.1 x 14.5 x 20.6 cm)	1.6 x 5.7 x 8.1 in (4.1 x 14.5 x 20.6 cm)
	Physical (HxWxD) **External**	3 x 8.8 x 11.7 in (7.7 x 22.3 x 29.5 cm)	3 x 8.8 x 11.7 in (7.7 x 22.3 x 29.5 cm)	3 x 8.8 x 11.7 in (7.7 x 22.3 x 29.5 cm)	3 x 8.8 x 11.7 in (7.7 x 22.3 x 29.5 cm)
	Physical (HxWxD) **1U Rack-mount**	1.7 x 16.88 x 25.25 in (4.32 x 42.88 x 64.14 cm)	1.7 x 16.88 x 25.25 in (4.32 x 42.88 x 64.14 cm)	1.7 x 16.88 x 25.25 in (4.32 x 42.88 x 64.14 cm)	1.7 x 16.88 x 25.25 in (4.32 x 42.88 x 64.14 cm)
	Shipping (HxWxD) **Internal**	7.9 x 9.4 x 11.4 in (24 x 31 x 39 cm)	7.9 x 9.4 x 11.4 in (24 x 31 x 39 cm)	7.9 x 9.4 x 11.4 in (24 x 31 x 39 cm)	7.9 x 9.4 x 11.4 in (24 x 31 x 39 cm)
	Shipping (HxWxD) **External**	9.4 x 12.2 x 15.4 in (24 x 31 x 39 cm)	9.4 x 12.2 x 15.4 in (24 x 31 x 39 cm)	9.4 x 12.2 x 15.4 in (24 x 31 x 39 cm)	9.4 x 12.2 x 15.4 in (24 x 31 x 39 cm)
	Shipping (HxWxD) **1U Rack-mount**	12.0 x 23.5 x 33.5 in (30.5 x 59.7 x 85.1 cm)	12.0 x 23.5 x 33.5 in (30.5 x 59.7 x 85.1 cm)	12.0 x 23.5 x 33.5 in (30.5 x 59.7 x 85.1 cm)	12.0 x 23.5 x 33.5 in (30.5 x 59.7 x 85.1 cm)

		LTO-2 HH Ultrium 448	LTO-3 HH Ultrium 920	LTO-4 HH Ultrium 1760	LTO-5 HH Ultrium 3000
Weight	Out of box, Internal	3.2 lb (1.45 kg)	3.2 lb (1.45 kg)	3.2 lb (1.45 kg)	3.2 lb (1.45 kg)
	Out of box, External	10.3 lb (4.65 kg)	10.3 lb (4.65 kg)	10.3 lb (4.65 kg)	10.3 lb (4.65 kg)
	Out of box, 1U Rack-mount	21.0 lb (9.52 kg)	21.0 lb (9.52 kg)	21.0 lb (9.52 kg)	21.0 lb (9.52 kg)
	Shipping, Internal	5.1 lb (2.3kg)	5.1 lb (2.3kg)	5.1 lb (2.3kg)	5.1 lb (2.3kg)
	Shipping, External	11 lb (5 kg)	11 lb (5 kg)	11 lb (5 kg)	11 lb (5 kg)
	Shipping, 1U Rack-mount	32.9 lb (14.8 kg)	32.9 lb (14.8 kg)	32.9 lb (14.8 kg)	32.9 lb (14.8 kg)

		LTO-2 HH Ultrium 448	LTO-3 HH Ultrium 920	LTO-4 HH Ultrium 1760	LTO-5 HH Ultrium 3000
Capacity	Native	200 GB	400 GB	800 GB	1.5 TB
	Compressed (assumes 2:1 data compression)	400 GB	800 GB	1.6 TB	3 TB
	Buffer Size	64 MB	64 MB	128 MB	256 MB
Performance	Sustained transfer rate, native	24 MB/s	60 MB/s	80 MB/s	140 MB/s
	Sustained transfer rate, compressed	48 MB/s	120 MB/s	160 MB/s	280 MB/s

	(assumes 2:1 data compression)				
	Burst transfer rate	160 MB/s (with Ultra3 SCSI wide); 300 MB/s (with 3Gb/sec SAS)	320 MB/s (with Ultra320 SCSI); 300 MB/s (with 3Gb/sec SAS)	300 MB/s (with 3Gb/sec SAS)	600 MB/s (with 6Gb/s SAS)
	Data rate matching range	0-24 MB/s (native)	20-60 MB/s (native)	33-80 MB/s (native)	47-140 MB/s (native)
	Data access time (from BOT)	64 s typical for a 200 GB tape (native)	64 s typical for a 200 GB tape (native)	64 s typical for a 800 GB tape (native)	52 s typical for a 1.5 TB tape (native)
	Average load time	>19 s	>19 s	>19 s	>19 s
	Average unload time	19 s	19 s	19 s	19 s
	Rewind time from EOT	121 s (200 GB tape)	121 s (400 GB tape)	124 s (800 GB tape)	96 s (1.5 TB tape)
	Rewind tape speed	5.0 m/s	5.0 m/s	7.0 m/s	9.0 m/s
Reliability	MTBF	250,000 hours at 100% duty cycle	250,000 hours at 100% duty cycle	250,000 hours at 100% duty cycle	250,000 hours at 100% duty cycle
	Uncorrected Error Rate	1 in 1x10 ^{17} bits	1 in 1x10 ^{17} bits	1 in 1x10 ^{17} bits	1 in 1x10 ^{17} bits
Media Compatibility		LTO Ultrium 1 (Read and Write); LTO Ultrium 2 (Read and Write)	LTO Ultrium 1 (Read only); LTO Ultrium 2 (Read and Write); LTO Ultrium 3 (Read and Write)	LTO Ultrium 2 (Read only); LTO Ultrium 3 (Read and Write); LTO Ultrium 4 (Read and Write)	LTO Ultrium 3 (Read only); LTO Ultrium 4 (Read and Write); LTO Ultrium 5 (Read and Write)

		LTO-2 HH Ultrium 448	**LTO-3 HH Ultrium 920**	**LTO-4 HH Ultrium 1760**	**LTO-5 HH Ultrium 3000**
Tape Format	Recording method	8-channel linear serpentine	16-channel linear serpentine	16-channel linear serpentine	16-channel linear serpentine
	Recording format	LTO Ultrium 2 LTO Ultrium 1 (for 100 GB tape)	LTO Ultrium 3 LTO Ultrium 2 (for 200 GB tape)	LTO Ultrium 4 LTO Ultrium 3 (for 400 GB tape)	LTO Ultrium 5 LTO Ultrium 4 (for 800 GB tape)
	Data compression	LTO DC dual mode compression (an enhanced version of ALDC)	LTO DC dual mode compression (an enhanced version of ALDC)	LTO DC dual mode compression (an enhanced version of ALDC)	LTO DC dual mode compression (an enhanced version of ALDC)
	Error detection/correction	Reed-Solomon	Reed-Solomon	Reed-Solomon	Reed-Solomon
	Read channel technology	Partial Response Maximum Likelihood (PRML)	Partial Response Maximum Likelihood (PRML)	Partial Response Maximum Likelihood (PRML)	Partial Response Maximum Likelihood (PRML)
	Data encoding method	RLL 0,13/11	RLL 0,13/11	RLL 0,13/11	RLL 32/33
Interface	Interface type	Wide Ultra3 SCSI (LVDS) or 3Gb/sec SAS	Ultra320 SCSI (LVDS) or 3Gb/sec SAS	Ultra320 SCSI (LVDS) or 3Gb/sec SAS	6Gb/sec Dual Port SAS
	SCSI connector	SCSI Internal: 68-pin LVDS SCSI External: 68-pin HD LVDS	SCSI Internal: 68-pin LVDS SCSI External: 68-pin HD LVDS	SCSI Internal: 68-pin LVDS SCSI External: 68-pin HD LVDS	N/A

		SCSI Array module: 80-pin SCA (SCSI and power) SCSI Rack-mount: 68-pin HD LVDS	SCSI Rack-mount: 68-pin HD LVDS		
	SAS connector	SAS Internal: mini-SAS SFF-8482 SAS External: mini-SAS SFF-8088	SAS Internal: mini-SAS SFF-8482 SAS External: mini-SAS SFF-8088	SAS Internal: mini-SAS SFF-8482 SAS External: mini-SAS SFF-8088	SAS Internal: mini-SAS SFF-8087 SAS External: mini-SAS SFF-8088
		LTO-2 HH Ultrium 448	**LTO-3 HH Ultrium 920**	**LTO-4 HH Ultrium 1760**	**LTO-5 HH Ultrium 3000**
Power Specifications	**Power requirements, Internal** (including rack-mount model)	+5V@2.5A (typical) +5V@2.5A (max) +12V@0.7A (typical) +12V@2.1A (max)	+5V@2.5A (typical) +5V@2.5A (max) +12V@0.7A (typical) +12V@2.1A (max)	+5V@2.5A (typical) +5V@2.5A (max) +12V@0.7A (typical) +12V@2.1A (max)	5V@3.5A (typical) +5V@3.7A (max) +12V@0.7A (typical) +12V@1.9A (max)
	Power requirements, External	100 to 240 VAC, 50-60 Hz, auto-ranging, 0.7A max	100 to 240 VAC, 50-60 Hz, auto-ranging, 0.7A max	100 to 240 VAC, 50-60 Hz, auto-ranging, 0.7A max	100 to 240 VAC, 50-60 Hz, auto-ranging, 0.7A max
	Power requirements, Array Module	+5V@2.5A (typical) +5V@2.5A (max) +12V@0.7A (typical) +12V@2.1A (max)	+5V@2.5A (typical) +5V@2.5A (max) +12V@0.7A (typical) +12V@2.1A (max)	N/A	N/A
	Power consumption	13 Watts idle 20 Watts typical 33 Watts max	13 Watts idle 20 Watts typical 33 Watts max	13 Watts idle 20 Watts typical 33 Watts max	7 Watts idle 24 Watts typical 34 Watts max

Environmental Specifications	Temperature range	Operating: 50° F to 95° F (10° C to 35° C) if 6 CFM airflow is provided 50° F to 104° F (10° C to 40° C) if 8CFM airflow is provided for Full-Height, 5CFM airflow for Half-Height
		Non-Operating: -40° F to 151° F (-40° C to 66° C)
	Non-condensing humidity range	Operating: 20 to 80% RH (Non-condensing, max wet bulb temperature = 26C)
		Non-Operating: 10 to 95% RH (Non-condensing, max wet bulb temperature = 26C)
Standards Compliance	CSA Certification to C22.2, No.60950 (cCSAus) TÜV EN60950 (IEC 60950 and EN60950) CE Declaration of Conformity FCC 47 CFR Parts 15 NOM VCCI C-TICK RRL BSMI GOSH CB Certificate and Report (IEC 60950)	

Front Panel LED Indicators	FREECOM LTO Ultrium 2,3 and 4 tape drives have four LED indicators on the front panel: • Ready • Drive Error • Tape Error • Clean FREECOM LTO Ultrium 5 tape drives have five LED indicators on the front panel: • Ready • Drive Error • Tape Error • Clean • Encryption

		LTO-2 HH Ultrium 448	**LTO-3 HH Ultrium 920**	**LTO-4 HH Ultrium 1760**	**LTO-5 HH Ultrium 3000**
Freecom Product Codes	Internal	LVD-SCSI: **25251**	LVD-SCSI: **28301**	LVD-SCSI: **30778**	
		SAS: **34260**	SAS: **29763**	SAS: **30779**	SAS: **34374**
	external	LVD-SCSI: **25336**	LVD-SCSI: **28302**	LVD-SCSI: **31683**	
		SAS: **34285**	SAS: **30776**	SAS: **30781**	SAS: **34376**